CLAIMS

1. An optical storage medium comprising:

- a main substrate,
- an information surface being associated with the main substrate, and
- at least one compensating layer.

2. An optical storage medium according to claim 1, wherein the at least one compensating layer is positioned between the information surface and an outer surface of the medium.

3. An optical storage medium according to claims 1 or 2, wherein the at least one compensating layer changes a phase and/or amplitude of a propagating electromagnetic wave front according to a first optical transfer function so as to adapt the optical storage medium to be read or recorded by a detector/emitter being pre-set to read or record information at an information surface through a medium changing the phase and/or amplitude of a propagating wave front according to a predetermined optical transfer function,
wherein the first optical transfer function is different from the predetermined optical transfer function.

4. An optical storage medium according to claim 2, wherein the compensating layer is positioned between the outer surface and the information surface for compensating for the at least first distance being different from a predetermined distance by optically reducing a spot size of an light beam incident on the information surface.

5. An optical storage medium according to claim 2, wherein the compensating layer is positioned between the outer surface and the information surface for compensating for aberrations caused by the at least first distance being different form a predetermined distance.

6. An optical storage medium comprising:

- a main substrate, and
- at least one information surface positioned at at least a first distance from an outer surface of the medium,

wherein the information surface comprises information in the form of a deep surface relief, having a profile being larger than a predetermined profile whereby correction of aberrations caused by the at least first distance being different from a predetermined distance is obtained.

7. An optical storage medium according to any of the preceding claims, further comprising at least one additional substrate, each additional substrate having a first and a second surface.

8. An optical storage medium according to claim 7, wherein at least one of the at least one additional substrate(s) are substantially parallel to a plane defined by the main substrate.

9. An optical storage medium according to claim 6, wherein the deep surface relief comprises pits having a pit depth between 0,5μm and 10μm.

10. An optical storage medium according to claims 6 or 7, wherein the deep surface relief acts as an artificial dielectric surface.

11. An optical storage medium according to any of the preceding claims, wherein an information surface comprises information in digital form.

12. An optical storage medium according to any of the preceding claims, wherein the information surface supports definition of at least a first nano-structure representing information in digital form.

13. An optical storage medium according to any of claims 4-6, wherein the predetermined distance is 1,2 mm.

14. An optical storage medium according to any of claims 4-6, wherein the predetermined distance is 0,6 mm.

15. An optical storage medium according to any of the preceding claims, wherein the compensating layer comprises an interference filter.

16. An optical storage medium according to claim 15, wherein the interference filter comprises a transmission filter.

17. An optical storage medium according to claims 15 or 16, wherein the interference filter comprises a reflection filter.

18. An optical storage medium according to any of claims 15-17, wherein the interference filter comprises a low pass filter.

19. An optical storage medium according to any of claims 15-18, wherein the interference filter comprises a high pass filter.

20. An optical storage medium according to any of claims 16 or 17, wherein the transmission/reflection characteristic is selected to be within +/- 20 nm of a centre wavelength.

21. An optical storage medium according to any of claims 18 or 19, wherein the transmission/reflection characteristic of the high pass/low pass filter is selected to have a transition slope being less than 20 nm.

22. An optical storage medium according to any of the preceding claims, wherein the compensating layer comprises liquid crystal materials.

23. An optical storage medium according to any of the preceding claims, wherein the information surface is read or recorded through the main substrate.

24. An optical storage medium according to any of the preceding claims, wherein the information surface is read or recorded through the compensating layer.

25. An optical storage medium according to any of the preceding claims, wherein the compensating layer comprises multiple layers.

26. An optical storage medium according to claim 25, wherein the multiple layers comprises alternating layers having high and low refractive indices, respectively.

27. An optical storage medium according to claim 26, comprising alternating layers of $TiO_2$ and $SiO_x$.

28. An optical storage medium according to any of claims 25-27, wherein the thickness of the multiple layers corresponds to 1/4 of a predetermined wavelength (L).

29. An optical storage medium according to any of claims 26-28, comprising a number of alternating layers of $TiO_2$ and $SiO_x$, being interconnected via an intermediate layer.

30. An optical storage medium according to claim 29, wherein the thickness of the intermediate layer corresponds to a predetermined wavelength (4L)

31. An optical storage medium according to any of claims 26-30, wherein the alternating layers comprises polyester and acrylic.

32. An optical storage medium according to any of the preceding claims, wherein the compensating layer comprises optical birefringent material.

33. An optical storage medium according to claim 32, wherein reflectivity of the compensating layer for p-polarized light is controlled by controlling the birefringent properties of the birefringent material.

34. An optical storage medium according to claim 32, wherein Brewsters angle of the compensating layer is controlled by controlling the birefringent properties of the birefringent material.

35. An optical storage medium according to any of the preceding claims, wherein the information surface is formed in the main substrate.

36. An optical storage medium according to any of claims 7-35, wherein the information surface is formed in the at least one additional substrate.

37. An optical storage medium according to any of claims 1-34, wherein the information surface is formed in a film layer deposited on the main substrate.

38. An optical storage medium according to claim 37, further comprising a buffer layer between the main substrate and the film layer.

39. An optical storage medium according to any of claims 37 or 38, wherein the film layer is reflective.

40. An optical storage medium according to claim 37, wherein the film layer is covered by a reflective layer.

41. An optical storage medium according to any of claims 37-40, wherein the film layer comprises a reflection filter.

42. An optical storage medium according to any of the preceding claims, wherein the substrate comprises at least a material selected from the group consisting of metal, alloys, glass, polymers, elastomers, paper, cardboard, wood, veneer, plywood, fiber materials, bio-materials, stones, ceramics or concrete or any combination thereof.

43. An optical storage medium according to any of the preceding claims, wherein the substrate comprises at least one material selected from the group consisting of polyester, such as PET or APET, acrylics, polyethylene naphathalate (PEN), polymethylmethacrylate (PMMA), polystyrene, acrylbutatinstyrene, polypropylene and polyetylene.

44. An optical storage medium according to any of the preceding claims, wherein the main substrate comprises a metal or an alloy, the metal or alloy comprising iron, steel, aluminium, magnesium, titanium, copper, nickel, zinc, cadmium, tin, lead, chrome, tungsten, silver, gold, platinum, stainless steel, tinplate and molybdenum.

45. An optical storage medium according to any of claims 37-44, wherein the film layer and/or the reflective layer is coated by a protective layer.

46. An optical storage medium according to any of the preceding claims, further comprising a planarising layer.

47. An optical storage medium according to claim 46, wherein one layer comprises the protective layer and the planarising layer.

48. An optical storage medium according to any of the preceding claims, wherein the thickness of the compensating layer is 0,5μm - 200μm, such as 1-50μm.

49. An optical storage medium according to any of the preceding claims, wherein the main substrate comprises a substantially non-transparent material.

50. An optical storage medium according to any of the preceding claims, wherein the information surface makes the optical storage medium recognisable for an optical detecting device.

51. An optical storage medium according to any of claims 12-50, further comprising a second nano-structure supporting definition of the first nano-structure.

52. An optical storage medium according to any of claims 12-52, wherein the information surface comprises at least one geometrical structure supporting definition of the first nano-structure.

53. An optical storage medium according to claim 52, wherein the geometrical structure comprises a first zone defining a first nano-structure.

54. An optical storage medium according to claims 51 and 52, wherein the geometrical structure comprises a second zone defining the second nano-structure.

55. An optical storage medium according to any of claims 52-54, wherein the geometrical structure forms a helix.

56. An optical storage medium according to any of claims 52-55, wherein the optical storage medium comprises a plurality of concentric geometrical structures.

57. An optical storage medium according to any of the preceding claims, wherein the main substrate comprises a first and an opposite second surface, at least one of said surfaces comprising at least one information surface.

58. An optical storage medium according to of any of the preceding claims, wherein at least one information surface of the main substrate is reflective.

59. An optical storage medium according to any of the preceding claims, further comprising a multi-layer structure provided on a first surface of the main substrate.

60. An optical storage medium according to any of the preceding claims, further comprising a multi-layer structure provided on a second surface of the main substrate.

61. An optical storage medium according to any of claims 59 or 60, and claim 7, wherein the multi-layer structure comprises at least one additional substrate.

62. An optical storage medium according to any of claims 59-61, wherein the multi-layer structure comprises a first additional substrate, at least a part of said first additional substrate being connected to the surface on the main substrate on which the multi-layer structure is provided.

63. An optical storage medium according to any of claims 7-62, wherein the coefficient of reflection of a first additional substrate is higher than the coefficient of reflection of a second additional substrate.

64. An optical storage medium according to any of claims 7-63, wherein at least one additional substrate comprises a semi-transparent material.

65. An optical storage medium according to any of claims 7-63, wherein at least one additional substrate comprises a transparent material.

66. An optical storage medium according to any of claims 59-65, wherein at least one substrate of the multi-layer structure is a peelable foil adhesively bonded to the main substrate and/or a substrate of the multi-layer structure.

67. An optical storage medium according to claim 66, wherein the peelable foil comprises a slip for removal of the foil from the substrate.

68. An optical storage medium according to any of claims 66 or 67, wherein the peelable foil in a pealed state is non-re-applicable to a surface of the optical storage medium.

69. An optical storage medium according to any of the preceding claims, further comprising a supporting means extending from a plane defined by the main substrate and/or the multi-layer structure.

70. An optical storage medium according to claim 69, wherein the supporting means is formed by a curled edge portion of the main substrate and/or the multi-layer structure substrate.

71. An optical storage medium according to any of the preceding claims, wherein the storage medium is provided with a centre hole.

72. An optical storage medium according to claim 71, wherein the curled edge-portion is formed along an edge of the centre hole.

73. An optical storage medium according to any of claims 70-72, wherein the curled edge-portion is formed along an outer peripheral edge of the main substrate and/or the multi-layer structure.

74. An optical storage medium according to claim 73, wherein the curled edge portion of the centre hole and the curled edge portion of the outer peripheral edge extends in substantially the same direction in relation to the plane defined by the main substrate and/or the multi-layer structure.

75. An optical storage medium according to any of the preceding claims, further comprising detachable protecting means for protecting at least a part of the nano-structure.

76. An optical storage medium according to claim 75, wherein the protecting means is adapted to engage the centre hole of the substrate.

77. An optical storage medium according to any of claims 75 or 76, wherein the peripheral surface of the protecting means is shaped as a polygon, such as a quadrangle or a triangle.

78. An optical storage medium according to any of claims 7-49, wherein at least one additional substrate comprises a non-metallic material.

79. An optical storage medium according to claim 78, wherein the non-metallic material is selected from the group consisting of lacquers, polymers, elastomers, laminated plastic, printing inks or any combination thereof.

80. An optical storage medium according to any of claims 39-79, wherein the reflective layer comprises a material having a high refractive index selected from the group consisting of aluminium, silver, gold, platinum, chrome, titanium dioxide and zirconium dioxide and any combination thereof.

81. An optical storage medium according to any of the preceding claims, wherein the thickness of the main substrate is selected within the range of 125-1000 µm.

82. An optical storage medium according to any of claims 7-81, wherein the thickness of the at least one additional substrate is selected within the range 0,1-1000 µm.

83. An optical storage medium according to any of claims 39-82, wherein the thickness of the reflective layer is selected within the range of 0,01-1 µm.

84. An optical storage medium according to any of claims 39-83, wherein at least one of the reflective layers comprises an active reflective layer which may be changed between a non-reflective position and a reflective position.

85. An optical storage medium according to claim 84, wherein the active reflective layer comprises liquid crystals adapted to be changed between the two positions.

86. An optical storage medium according to any of the preceding claims, wherein the thickness of the curl portion is within the range 100-1500 µm.

87. An optical storage medium according to any of the preceding claims, wherein the thickness of the curl portion is approximately 1200 μm.

88. An optical storage medium according to any of the preceding claims, wherein the main substrate and/or the at least one additional substrate is provided with a colour print layer.

89. An optical storage medium according to claim 88, wherein the colour print layer is positioned between the main substrate and the at least one additional substrate.

90. An optical storage medium according to any of claims 88 or 89, wherein the colour print layer is positioned between a first additional substrate and a second additional substrate.

91. An optical storage medium according to any of claims 7-90, wherein at least one additional substrate in the multi-layer structure is coloured.

92. An optical storage medium according to any of the preceding claims, wherein the digital information represented in the nano-structure is audio and/or video and/or data, such as data for a computer, such as data for a computer game application.

93. An optical storage medium according to any of the preceding claims, wherein the nanostructure represents an image and/or text, such as a hologram.

94. An optical storage medium according to any of the preceding claims, wherein the optical storage medium is a Compact Disc, such as an audio CD, such as a super audio CD.

95. An optical storage medium according to any of the preceding claims, wherein the optical storage medium is a CD-ROM, such as a read-only CD-ROM, such as a recordable CD-ROM, such as a re-writable CD-ROM.

96. An optical storage medium according to any of the preceding claims, wherein the optical storage medium is a multi-layer medium, such as a DVD, such as a DVD+R/W such as a DVD-R/W such as a DVD-ROM.

97. An optical storage medium according to any of the preceding claims, wherein the optical storage medium is a disc-drive medium, such as a floppy disc such as a hard disc.

98. Use of an optical storage medium according to any of the preceding claims in a standard optical playback device.

99. Use of an optical storage medium having a thickness of less than 1,1 mm in a standard optical playback device.

100. A method of making an optical storage medium comprising a main substrate, the main substrate comprising a substantially non-transparent material, said method comprising the steps of:

- forming an information surface into a surface of the optical storage medium, the information surface supporting definition of a first nano-structure representing information in digital form.
- providing at least one compensating layer being associated with the information surface.

101. A method according to claim 100, further comprising the step of forming a first nano-structure into the information surface, the first nano-structure representing information in digital form.

102. A method according to any of claims 100 or 101, wherein the information surface is provided on the main substrate.

103. A method according to any of claims 100-102, further comprising the step of providing at least one additional substrate on the main substrate.

104. A method according to any of claims 100-103, further comprising the step of forming an information surface into the at least one additional.

105. A method according to any of claims 100-104, further comprising the step of covering at least one information surface with a reflective material.

106. A method according to any of claims 100-105, further comprising the step of forming a curled edge portion extending from a plane defined by the main substrate and/or the at least one additional substrate.

107. A method according to any of claims 100-106, wherein at least a part of the information surface is formed by a rolling process, a stamping process, a thermal process, an etching process, a cutting process, an electroforming process, an electrolytic process, a magnetic moulding, moulding, extruding and/or an electro-chemical process.

108. The use of a rolling process, a stamping process, a thermal process, an etching process, a cutting process, a magnetic moulding process, a moulding process, an extruding process, or an electro-chemical process for forming an information surface into a substantially non-transparent material, said information surface supporting definition of at least a first nano-structure representing information in digital form.

109. The use of a process according to claim 108, wherein the information surface comprises a first nano-structure representing information in digital form.